

## Northern Corn Leaf Blight-An Important Disease of Maize: An Extension Fact Sheet

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### ABSTRACT

*Northern Corn Leaf Blight (NCLB) or Turcicum Leaf Blight (TLB) is the most important and widespread maize leaf disease worldwide including in India. NCLB disease starts first on lower leaves and then spread up the whole plant under favourable weather conditions. High humidity associated with low temperature and cloudy weather is favourable conditions for disease development on the host plant. Heavy dew on the growing plant also as supportive factors to lead NCLB disease severity. NCLB reduces the grain yield of maize considerably all over the world. The disease causes leaf necrosis and premature death of leaves which can reduce the grain yield of maize by 28 to 91 per cent. Northern corn leaf blight is mainly controlled through the use of resistant varieties. Varieties are available with both monogenic and polygenic resistance and should be used whenever possible. Other approaches such as fungicides and residue management could be applied to control the NCLB disease in maize.*

**Key words:** Turcicum Leaf Blight, *Exserohilum turcicum*, Zea mays, Disease Cycle

**Northern Corn Leaf Blight:** Northern Corn leaf blight also commonly known as *Turcicum Leaf Blight (TLB)* is one of most important foliar disease of maize and caused by *Exserohilum turcicum*, the residue borne fungus. NCLB has now become one of the most prevalent and severe diseases in Eastern United states, Western Brazil, Latin America, Pakistan, India, Nepal, Bhutan and China. In India, the disease was reported as a serious problem in the states of Karnataka, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Orissa, Andhra Pradesh and North Eastern Hill states. NCLB can be severe when the condition is favourable. High humidity associated with low temperature and cloudy weather is favourable conditions for disease development on the host plant (Singh *et al.*, 2004). Heavy dew on the growing plant has also being cited as one of the factors leading to NCLB disease severity (Dingerdissen *et al.*, 1996; Levy and Cohen, 1983). NCLB causes leaf necrosis and premature death of foliage which reduces the fodder value and reduces the grain yield of maize considerably all over the world. Grain yield losses due to epiphytotics have been reported in several parts of India and these losses vary from 28 to 91 per cent depending upon the severity of the disease.

### SYMPTOMS

The disease symptoms primarily appear on the leaves. Plants may be infected at any growth stage, but usually at or after anthesis. The disease starts first as a small elliptical spot on the leaves, grayish green in colour with water soaked lesions. The spots turn greenish with age and increase in size, finally attaining a spindle shape. Individual spots are usually 3/4" wide and 2" to 3" long. Spores of the fungus develop abundantly on both sides of the spot. Heavily infected field presents a scorched appearance (Fig.1).



**Fig. 1 Northern Corn Leaf Blight**

## DISEASE CYCLE

The fungus causing NCLB overwinters as mycelia and conidia on corn residues left on the soil surface. The conidia are transformed into thick-walled resting spores called chlamydospores. During Warm, humid conditions, new conidia are produced on infested corn residues. These conidia acting as primary source of inoculums are spread when splashed by rain or carried by wind from distant areas and deposited on the surfaces of corn leaves. Once deposited, conidia germinate when free water mainly in the form of dew is present on the leaf surface for 6 to 16 hrs and temperature of 18-24°C. Conidia germinates developing a germ tube which penetrates through stomata, and invades the parenchyma cells. Dispersal of the fungus from both near and distant sources is important in the epidemiology of the disease. In moist temperate conditions, the fungus overwinters as mycelium and conidia produced on corn residues are left on the ground surface. In those conditions, the conidia can also develop into chlamydospores, thick-walled resting spores that remain viable for long periods of time. Five physiological races of the NCLB fungus are reported and infection associated with host dependent different genera and species on the race (Fig. 2).



**A- CONIDIA OF NCLB**



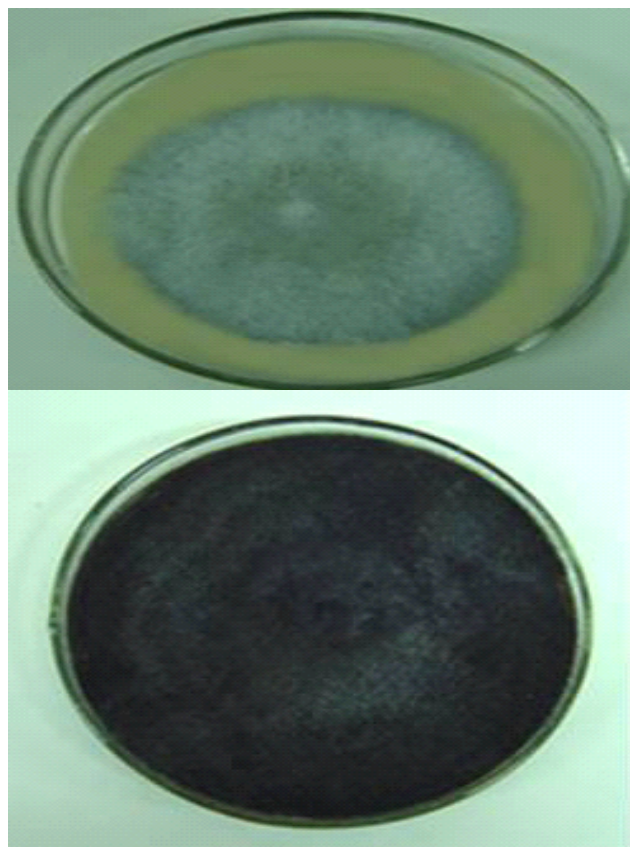
**B- DISEASE CYCLE**

**Fig. 2 Disease Cycle of Northern Corn Leaf Blight**

## INOCULATION

To prepare the inoculum, lesion is cut from the infected leaves and placed on the moist chamber for 2-3 days to allow the sporulation. Single spores are picked up from lesion with the aid of sterile microscope and transferred on PDA plate and incubated at room temperature. Individual colonies of *E. turcicum* are subsequently sub-cultured on to fresh PDA plates and used

to inoculate autoclaved sorghum kernels and allow colonizing the grains for about 10 days. The colonized sorghum kernels were air dried to field inoculation by placing 20-30 seeds of colonized sorghum kernels into leaf whorls. Inoculation was done 4-6 leaf stages at evening to allow successful infection when dew and ambient temperature is optimal and followed by two additional sprays of inoculums at one to three weeks intervals (Fig.3).



**A- Growth of *Exserohilum turcicum* on PDA**



**B- Multiplication on PDA**





**C- Multiplication on Sorghum grains**



**D- Creation of artificial inoculation in field**  
**Fig. 3 Procedure for Inoculation A, B, C and D**

## MANAGEMENT OF DISEASE

The most appropriate and economical strategy to manage Northern Corn Leaf Blight of maize is through

exploitation of host resistance, which is not only environmentally friendly but convenient to adapt at farmers' level. Host plant resistance plays a significant role in integrated disease management approach. Plants are evaluated for resistance to NCLB mostly at the soft dough stage, about 3 weeks after silk emergence using the different disease rating scale as 1-5 or 1-9 scale. Payak and Sharma (1985) used 1-5 disease rating scale to estimate the disease severity consists of five broad categories. In 1-5 disease rating scale, 1 indicates the resistance with slight infection of the disease, whereas 5 indicates high level of susceptibility.

Fungicide application can effectively control NCLB in field corn, popcorn and sweet corn when applied at the right time. Fungicides spray (Mancozeb and Propiconazole) are recommended only for fresh market sweet corn and hybrid seed production fields.

Other methodology to manage the disease is utilization of plant products a recent eco-friendly approach and gaining popularity because of its advantages over chemicals. These plant extracts are easily bio degradable, do not leave any residue, non-phototoxic and are easily absorbed by the plants and cost effective. The presence of naturally occurring substances in plants with antifungal properties have been reported and tested against wide range of fungi infecting many commercially important crops.

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